Highway Capacity Manual 6th Edition

A Guide for Multimodal Mobility Analysis

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Presenter

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Strong Concepts

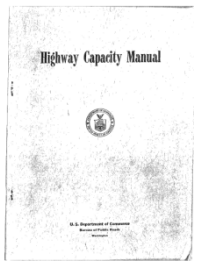
Dr. Roger Roess

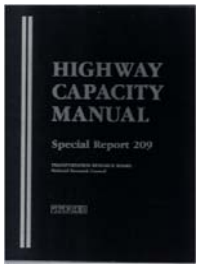
Outline

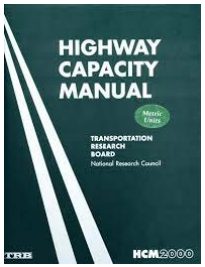
- Introduction and Overview
- Volume 1: Concepts
- Volume 2: Uninterrupted Flow
- Volume 3: Interrupted Flow
- Volume 4: Applications Guides
- Planning & Preliminary Engineering Applications Guide to the HCM
- Questions

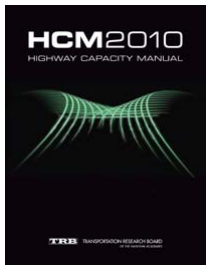
A Brief History of the HCM

- 1950: focus on capacity
- 1965: LOS concept, bus transit chapter
- 1985: new research, pedestrians, bicycles
  - 1994 & 1997 updates
- 2000: new research, multiple parts
- 2010: new research, multimodal focus, four volumes



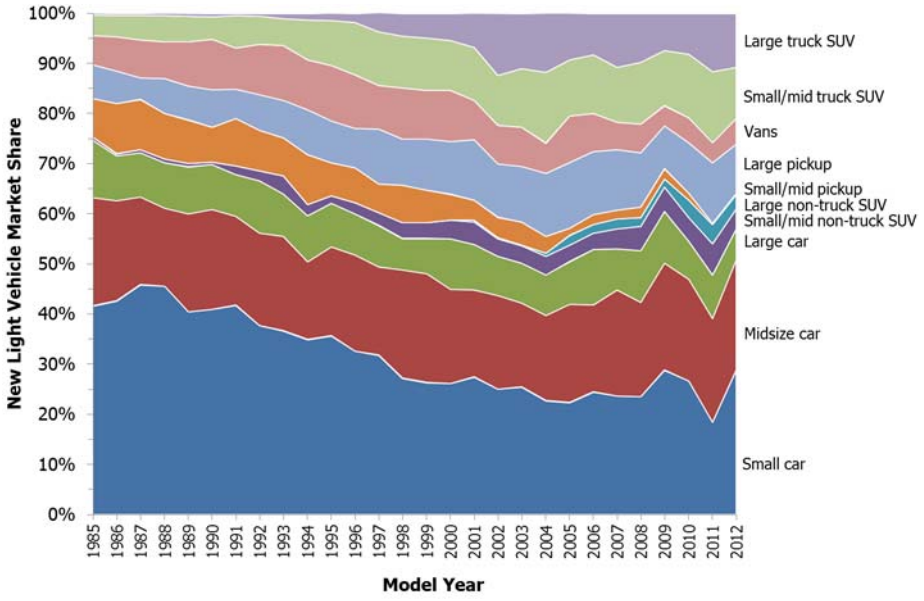






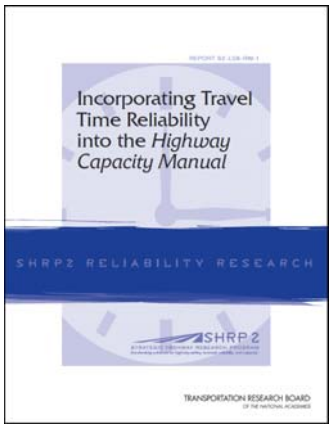
The Need for New Research

- Changes in driver behavior
- Changes in vehicle fleet mix & capabilities
- Increasing use of certain roadway features in the U.S.
  - Roundabouts, alternative intersections, managed lanes
- Greater methodological sensitivity to factors influencing roadway performance
- Broader range of performance measures

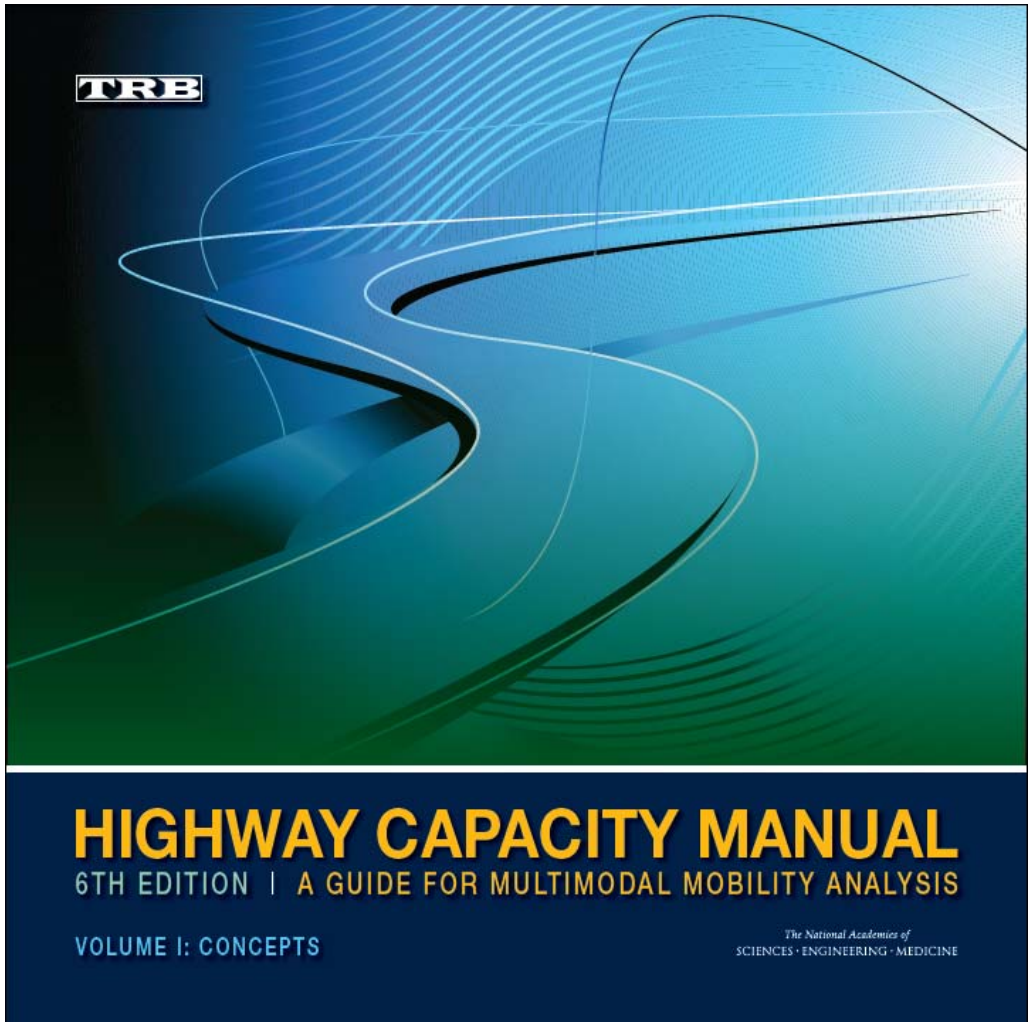


National Research Since HCM 2010

- NCFRP 41: truck analysis
- NCHRP 03-96: managed lanes
- NCHRP 03-100: roundabouts in corridors
- NCHRP 03-107: work zone capacity
- NCHRP 03-115: HCM production
- NCHRP 07-22: planning guide to HCM
- SHRP 2 L08: travel time reliability
- FHWA: ATDM, roundabouts, alternative intersections



HCM 6th Edition: A Guide to Multimodal Mobility Analysis



Significant Changes

- New Chapters 11 and 17 on travel time reliability
- Basic freeway segment and multilane highway methods combined
- Many new and updated methods
  - Managed lanes, work zones, alternative intersections and interchanges, urban street queue spillback, truck effects on freeway operations, and more
- Greater focus on providing the information users need to apply HCM methods in software and interpret the results

Chapter 11 – Freeway Reliability Analysis

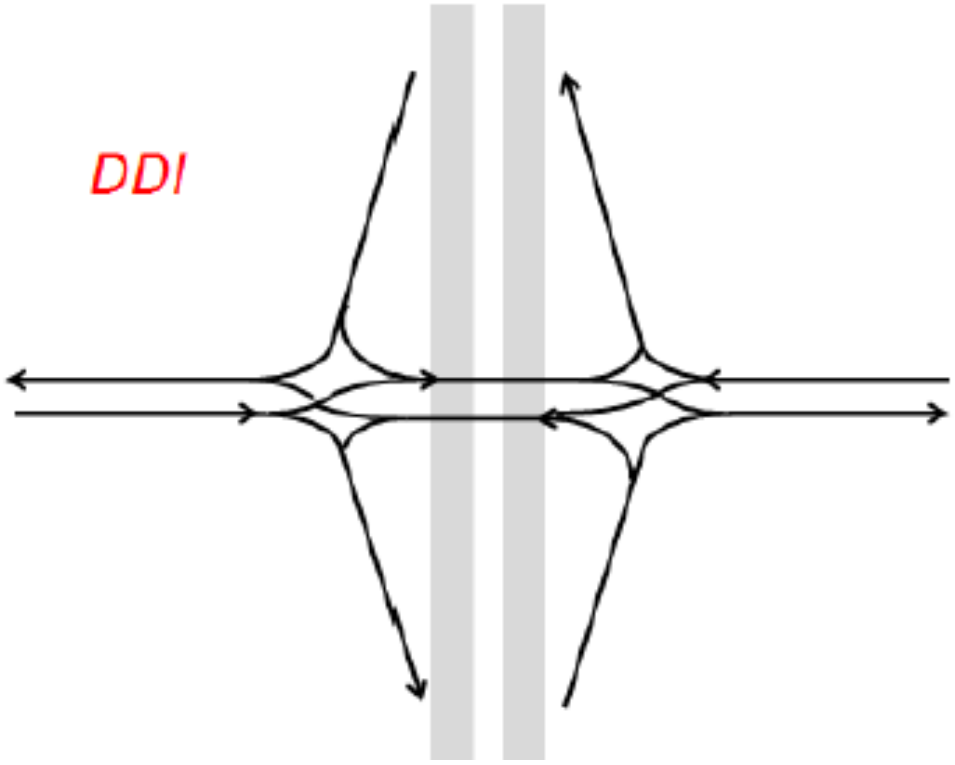
- Standalone, new chapter in HCM 6th Edition
- Updates the freeway travel time reliability materials from former Chap 36 & 37 in HCM2010 (SHRP-2, L08)
- Description of the computational steps has been revised to more clearly present individual steps
- Scenario generation process for freeway reliability analysis has been revised
  - Reduce number of scenarios and runtime
  - Improve modeling and using a Java Platform for computational engine

Signalized Intersections: Planning Application Comparison

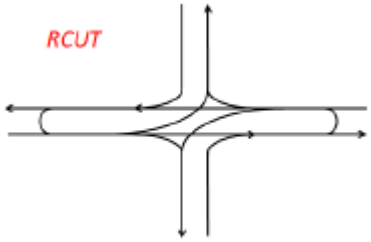
- Quick Estimation Method (QEM) (HCM 2010)
  - Requires calculation of delay to complete evaluation
- Planning-Level Analysis Application (HCM 6th Edition)
  - Two-part procedure
  - First part produces estimate of "sufficiency"
    - "Under", "Near", or "Over" capacity
  - Second part produces delay estimate and LOS
    - This part is used if delay and LOS are desired

Ramp Terminals

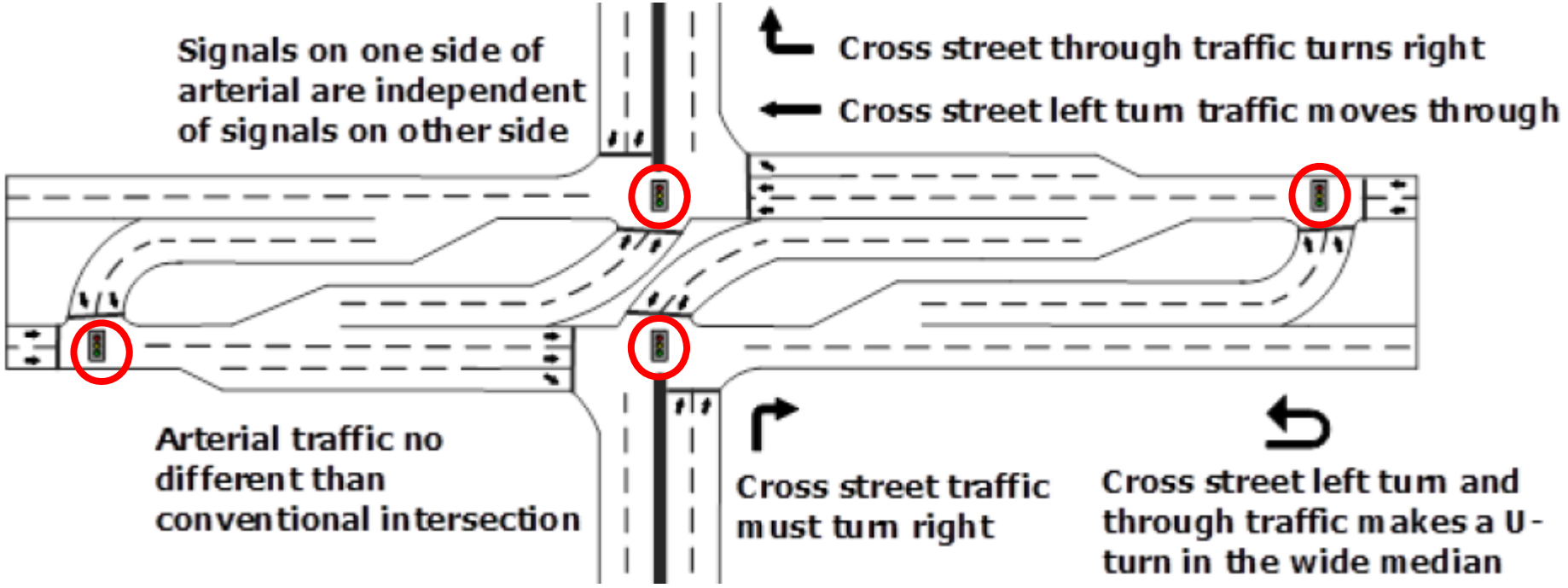
- New Interchange Configuration
  - Diverging diamond interchange (DDI)
    - Crossover at each terminal



Alternative Intersections

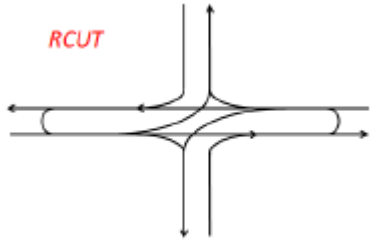


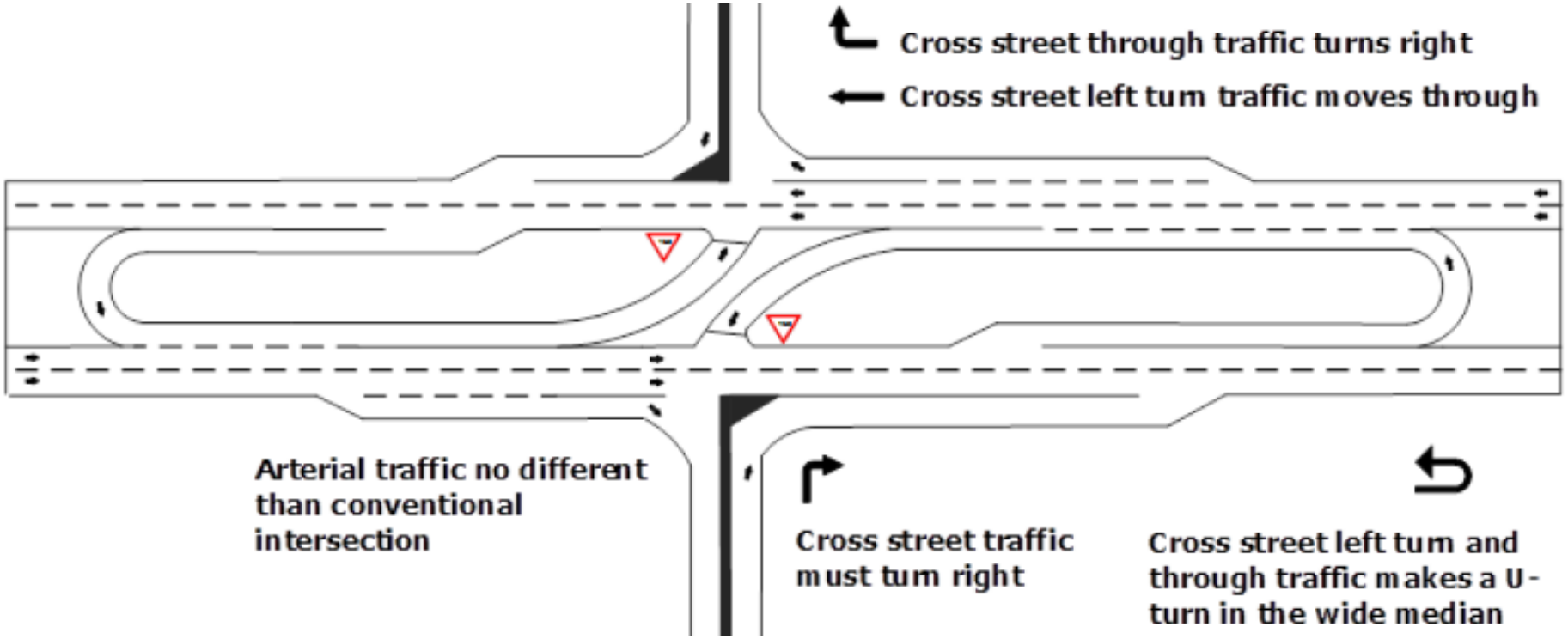
- Restricted Crossing U-Turn
  - Four-legged RCUT with signals



Alternative Intersections

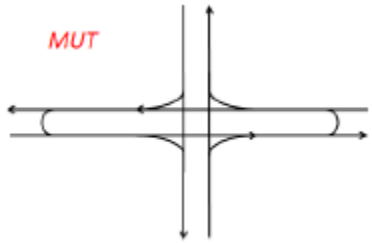
- Restricted Crossing U-Turn
  - Four-legged RCUT w/merges and diverges

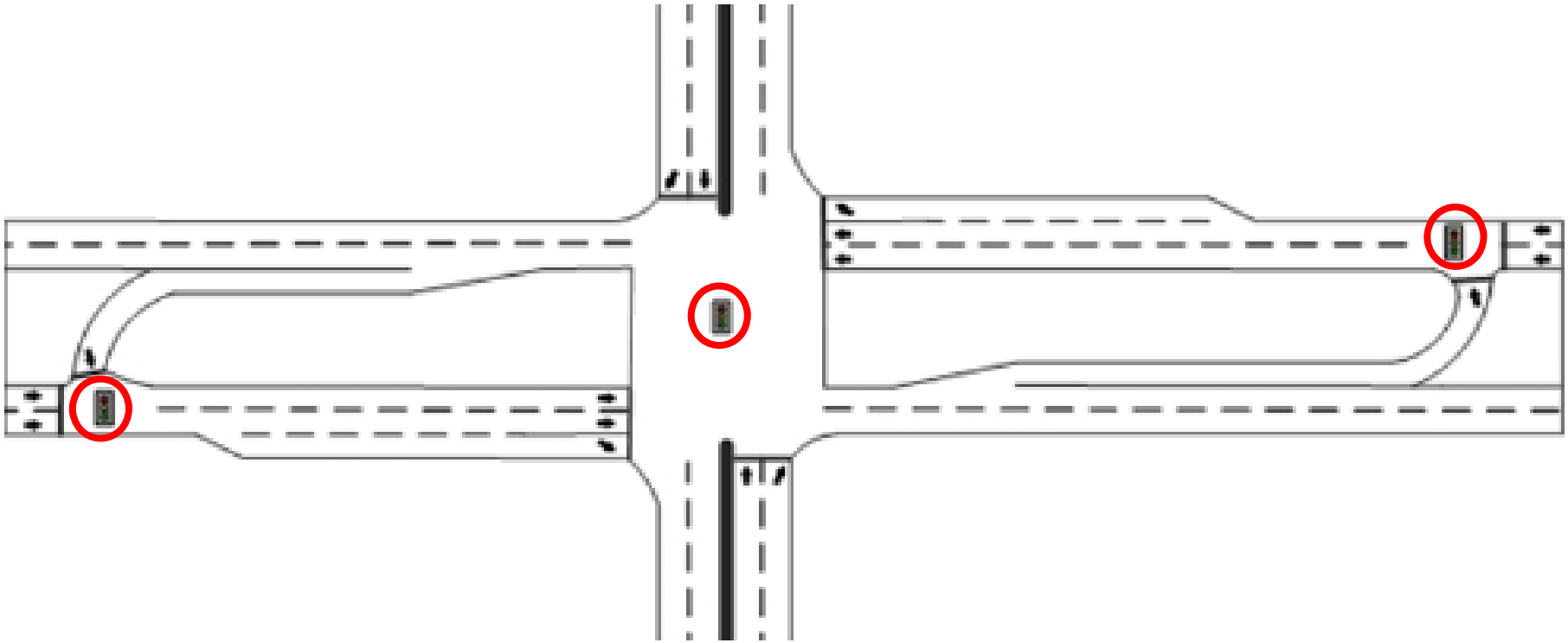




Alternative Intersections

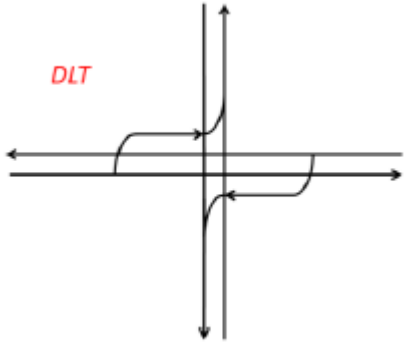
- Median U-Turn
  - Four-legged MUT with signals
    - Can also have stop signs



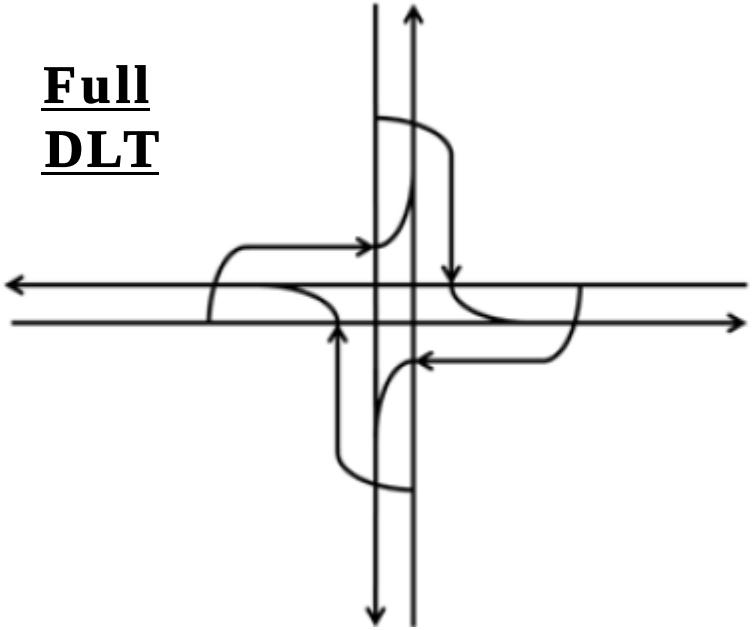


Alternative Intersections

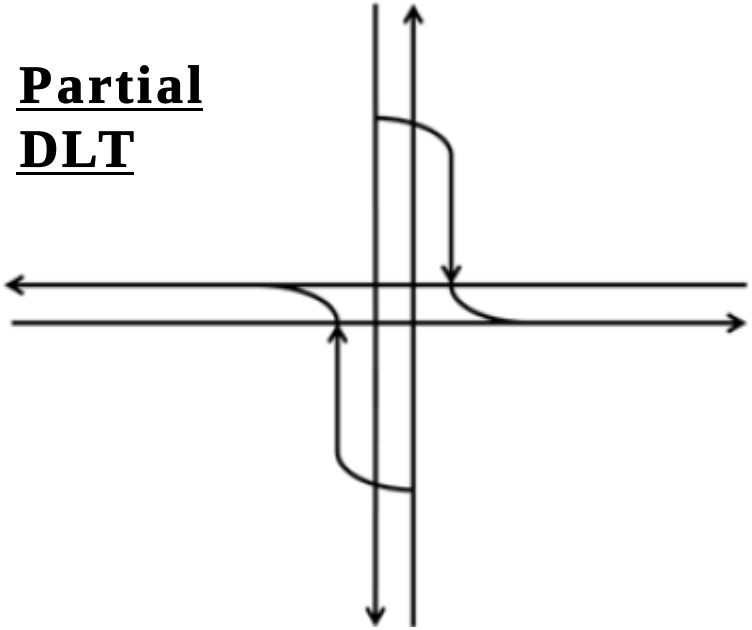
- Displaced Left Turn
  - Configurations
    - Partial DLT
    - Full DLT



Full DLT



Partial DLT



Roundabout Methodology

- Modified Capacity Equations
  - New coefficients for existing equations
  - Calibrated to recently collected data
  - Predicted capacity tends to be higher

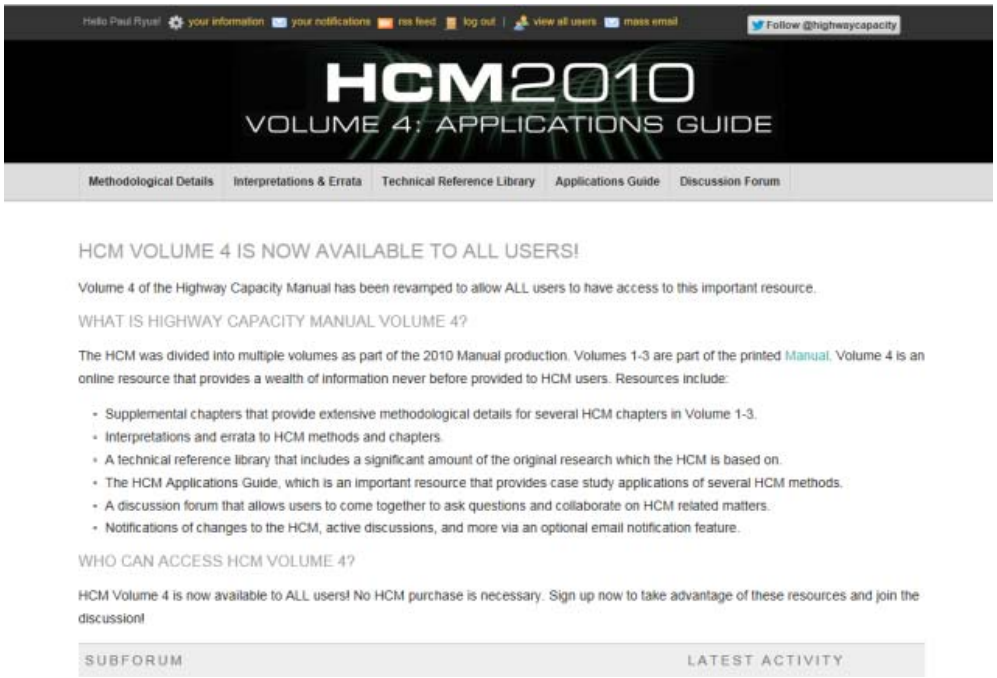
Entry Lanes	Opposing Lanes	Capacity by HCM Version and Conflicting Volume, veh/h			
		HCM 2010		**HCM 6th Edition**	
		V_c = 0 vph	V_c = 1000 vph	**V_c = 0 vph**	**V_c = 1000 vph**
1	2	1130	561	**1420**	**607**
Right	2	1130	561	**1420**	**607**
Left	2	1130	534	**1350**	**538**
1	1	1130	416	**1380**	**498**
R or L	1	1130	416	**1420**	**572**

Segment Methodology

- Roundabout Segment
  - New addition to the HCM 6th Edition
  - Based largely on NCHRP Report 772, Evaluating the Performance of Corridors with Roundabouts
  - Objective
    - Evaluate the operation of vehicles traveling along a segment bounded by roundabouts

HCM Volume 4

- Will be online at [hcm.trb.org](hcm.trb.org)
- Open to all, including those who don't have a personal copy of the HCM
  - Must sign up for a free user account to get access



- Until the 6th Edition is released, continue to access Volume 4 at www.hcm2010.org

Objectives for a Planning Guide

- NCHRP Project 07-22 was funded to develop a planning counterpart to the HCMAG that would describe:
  - Appropriate use of the HCM to a broad spectrum of planning applications
  - Use of default values and other HCM tools
  - Use of the HCM in scenario planning
  - Coordinated use of HCM with planning models
  - Use of the HCM in evaluating oversaturated conditions in a planning context

NCHRP Report 825:
Planning & Preliminary Engineering Applications Guide